Name: Date:

Exam: Function Reflections (Solution version 608)

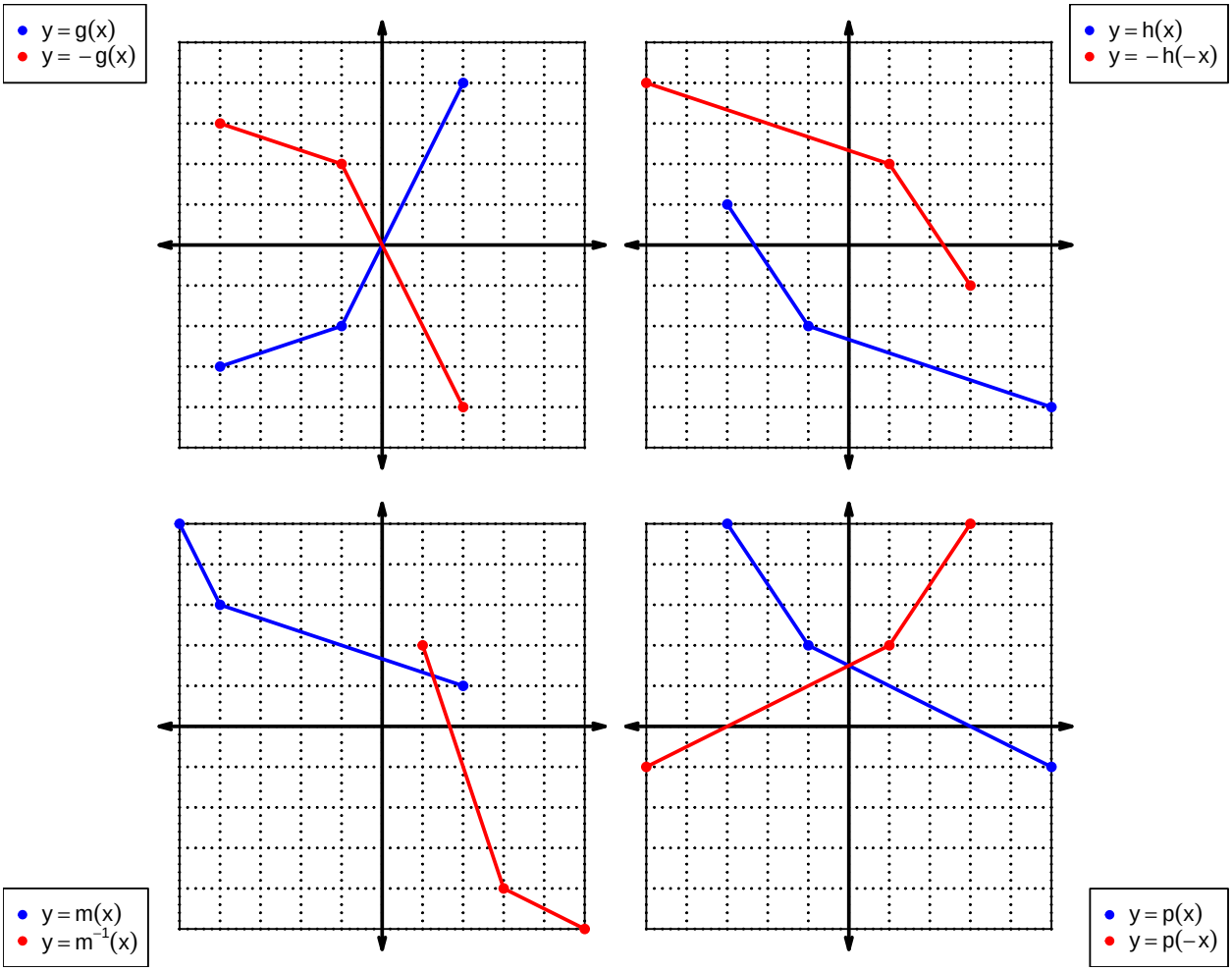
1. (worth 9 points) Let function f be defined by the polynomial below:

$$f(x) = -5x^5 + 3x^4 + 7x^3 + 9x^2 - 6x - 8$$

Draw lines that match each function reflection with its polynomial:

Reflections	Polynomials
$-f(x)$	$5x^5 - 3x^4 - 7x^3 - 9x^2 + 6x + 8$
$f(-x)$	$5x^5 + 3x^4 - 7x^3 + 9x^2 + 6x - 8$
$-f(-x)$	$-5x^5 - 3x^4 + 7x^3 - 9x^2 - 6x + 8$

2. (worth 20 points) In each xy plane shown below, a function is graphed with blue. Draw the indicated reflections (as a second curve, indicated in legend) with black (or with whatever you have). The x axis is horizontal and the y axis is vertical (as typical), and the scale is equal on both axes.



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For all questions on this page, the functions f, g, and h are defined by the table below.

x	$f(x)$	$g(x)$	$h(x)$
1	3	5	7
2	1	9	5
3	8	4	4
4	6	2	2
5	9	6	8
6	7	8	3
7	5	3	9
8	2	7	1
9	4	1	6

3. (worth 3 points) Evaluate $h(8)$.

$$h(8) = 1$$

4. (worth 3 points) Evaluate $f^{-1}(4)$.

$$f^{-1}(4) = 9$$

5. (worth 3 points) Assuming h is an **even** function, evaluate $h(-3)$.

If function h is even, then

$$h(-3) = 4$$

6. (worth 3 points) Assuming g is an **odd** function, evaluate $g(-5)$.

If function g is odd, then

$$g(-5) = -6$$

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7. (worth 15 points) A function, f, is **even** if $f(x) = f(-x)$ for all x in the domain. A function, g, is **odd** if $g(x) = -g(-x)$ for all x in the domain.
Let polynomial p be defined with the following equation:

$$p(x) = -x^3 - x$$

a. Express $p(-x)$ as a polynomial in standard form.

$$p(-x) = -(-x)^3 - (-x)$$
$$p(-x) = x^3 + x$$

b. Express $-p(-x)$ as a polynomial in standard form.

$$-p(-x) = -\left(x^3 + x\right)$$
$$-p(-x) = -x^3 - x$$

c. Is polynomial p even, odd, or neither?

odd

d. Explain how you know the answer to part c.

We see that $p(x) = -p(-x)$ for all x because $p(x)$ and $-p(-x)$ are equivalent polynomials. Thus function p satisfies the criterion for being an odd function.

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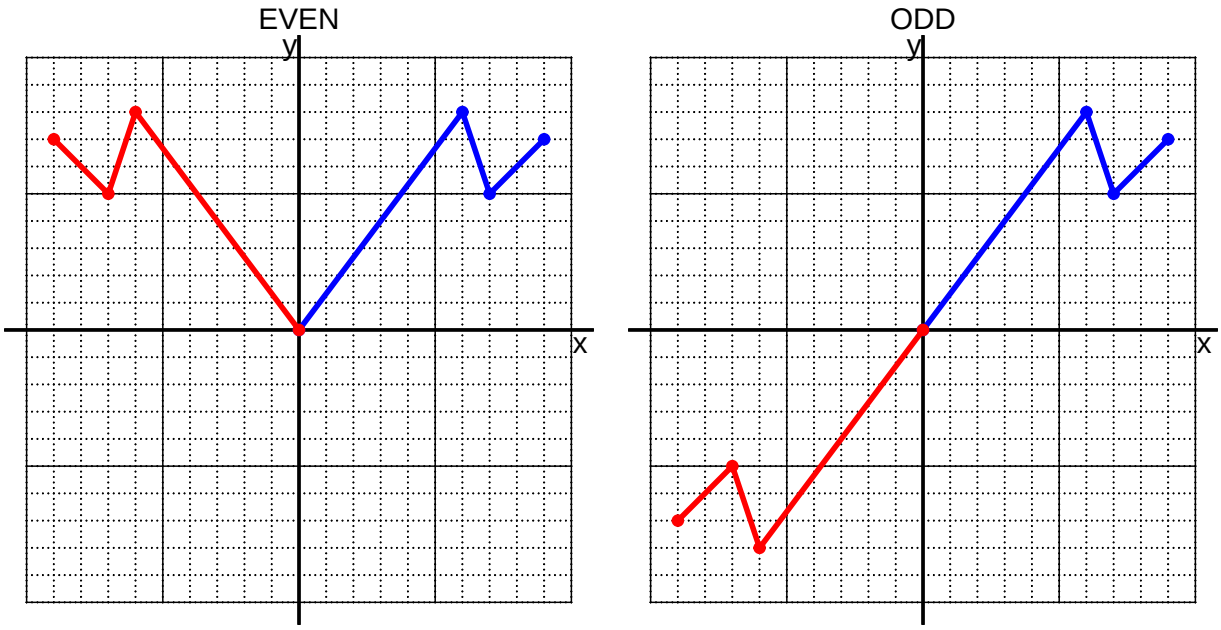
8. (worth 10 points) I have drawn half of a function. Draw the other half to make it even or odd.



9. (worth 10 points) Let function f be defined with the equation below.

$$f(x) = 4(x-5)$$

a. Evaluate $f(10)$.

step 1: subtract 5
step 2: multiply by 4

$$f(10) = 4((10)-5)$$
$$f(10) = 20$$

b. Evaluate $f^{-1}(80)$.

step 1: divide by 4
step 2: add 5

$$f^{-1}(x) = \frac{x}{4} + 5$$
$$f^{-1}(80) = \frac{(80)}{4} + 5$$
$$f^{-1}(80) = 25$$

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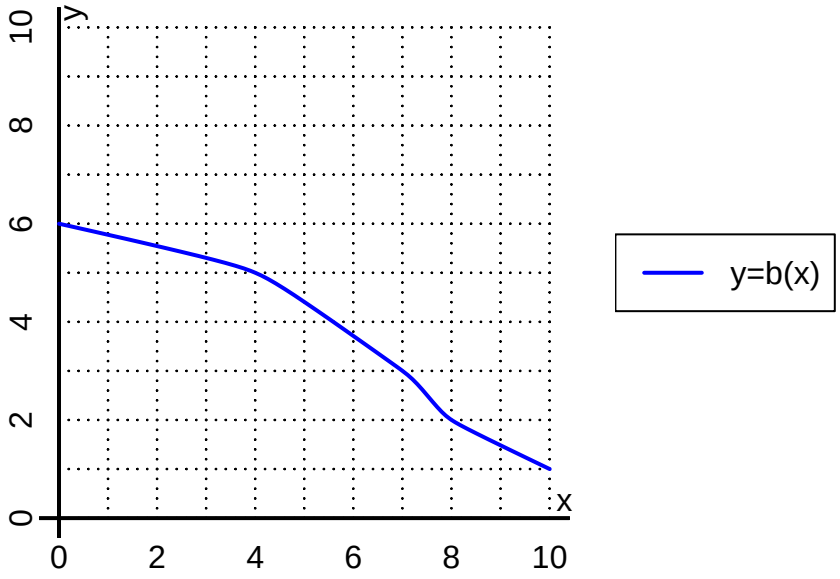
10. (worth 6 points) The function b is represented by the curve $y = b(x)$ graphed below.



a. Evaluate $b(4)$.

$b(4) = 5$

b. Evaluate $b^{-1}(3)$.

$b^{-1}(3) = 7$

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11. (worth 18 points) Function f is defined by the table below.

    a. Complete the columns for $-f(x)$ and $f(-x)$ and $-f(-x)$.

x	$f(x)$	$-f(x)$	$f(-x)$	$-f(-x)$
-2	6	-6	-6	6
-1	5	-5	5	-5
0	0	0	0	0
1	5	-5	5	-5
2	-6	6	6	-6

b. Is function f even, odd, or neither?

neither

c. How do you know the answer to part b?

Function f is neither because neither column $-f(-x)$ nor column $f(-x)$ matches column $f(x)$ exactly.